

UNITED STATES DISTRICT COURT  
EASTERN DISTRICT OF MICHIGAN  
SOUTHERN DIVISION

NATIONAL INSTITUTE FOR STRATEGIC  
TECHNOLOGY ACQUISITION AND  
COMMERCIALIZATION,

Plaintiff,

Case No. 11-11039  
HON. GEORGE CARAM STEEH

vs.

NISSAN OF NORTH AMERICA, et al.,

Defendants.

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OPINION AND ORDER REGARDING CLAIM CONSTRUCTION

I. INTRODUCTION

This matter is before the court for claim construction relative to United States Patent No. 5,239,955 (“955 patent”) and United States Patent No. 5,313,919 (“919 patent”) (“collectively “patents-in-suit”). The ‘919 and ‘955 patents are related patents because the ‘919 patent is a division of the ‘955 patent. Therefore, they share the same specification and both are titled “low friction reciprocating piston assembly.” The patents-in-suit cover a piston assembly with a solid film lubricant (“SFL”) coating, as well as a method for making such a piston. Plaintiff, National Institute for Strategic Technology Acquisition and Commercialization (“NISTAC”), claims that defendants-Nissan, Honda, and Toyota—make, use, sell, or offer for sale vehicles containing pistons with SFL coatings that infringe one or both patents-in-suit.

## II. CLAIM CONSTRUCTION

### A. Standard of Review

A determination of infringement requires a two-step analysis. Gentry Gallery, Inc. v. Berkline Corp., 134 F.3d 1473, 1476 (Fed. Cir. 1998). “First, the claim must be properly construed to determine its scope and meaning. Second, the claim as properly construed must be compared to the accused device or process.” Id. Claim construction is an issue of law. Markman v. Westview Instruments, Inc., 517 U.S. 370, 388-90 (1996). In interpreting claims, a court “should look first to the intrinsic evidence of record, i.e., the patent itself, including the claims, the specification and, if in evidence, the prosecution history.” Vitronics Corp. v. Conceptronic, Inc. 90 F.3d 1576, 1582 (Fed. Cir. 1996). Absent an express intent to impart a novel meaning, “terms in a claim are to be given their ordinary and accustomed meaning.” Renishaw PLC v. Marposs Societa’ per Azioni, 158 F.3d 1243, 1249 (Fed. Cir. 1998). Ordinary and customary meaning “is the meaning that the words would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application.” Phillips v. AWH Corp., 415 F.3d 1303, 1312-13 (Fed. Cir. 2005). It is the claims that measure the invention. SRI Int’l Inc. v. Matsushita Elec. Corp., 775 F.2d 1107, 1121 n. 14 (Fed. Cir. 1985).

The specification acts as a dictionary when it expressly defines terms used in the claims or when it defines terms by implication. Vitronics, 90 F.3d at 1582. The specification is always highly relevant to the claim construction analysis and the single best guide to the meaning of the disputed term. Id. at 1315. Although the specification often describes very specific embodiments of the invention, the Federal Circuit has repeatedly warned against confining the claims to those embodiments. Phillips, 415 F.3d at 1312.

Claims of a patent are not limited to a preferred embodiment described in the specification. Id. at 1323. While the Phillips court recognized that “the distinction between using the specification to interpret the meaning of a claim and importing limitations from the specification into the claim can be a difficult one to apply in practice[,]” it also found that “the line between construing terms and importing limitations can be discerned with reasonable certainty and predictability if the court’s focus remains on understanding how a person of ordinary skill in the art would understand the claim terms.” Id. In order for the court to avoid importing limitations from the specification into the claims,

[i]t is important to keep in mind that the purposes of the specification are to teach and enable those of skill in the art to make and use the invention and to provide a best mode for doing so. One of the best ways to teach a person of ordinary skill in the art how to make and use the invention is to provide an example of how to practice the invention in a particular case. Much of the time, upon reading the specification in that context, it will become clear whether the patentee is setting out specific examples of the invention to accomplish those goals, or whether the patentee instead intends for the claims and the embodiments in the specification to be strictly coextensive. The manner in which the patentee uses a term within the specification and claims usually will make the distinction apparent.

Id.

If the intrinsic evidence alone will resolve any ambiguity on a disputed claim term, then it is improper to rely on extrinsic evidence. Anything outside of the intrinsic evidence (patent itself, the specification, the file history) is extrinsic evidence. See Vitronics, 90 F.3d at 1576, 1582. The interpretation of patent claims is more a legal than a factual determination and is to be made by judges rather than juries. Markman, 517 U.S. at 388-90. The court must construe the terms of art forming parts of the claim. Framson v. Advance Offset Plate, Inc., 720 F.2d 1565 (Fed. Cir. 1983). While words in a claim are generally given their ordinary and customary meaning, a patentee may choose to be his

own lexicographer and use terms in a manner other than their ordinary meaning, as long as the special definition of the term is stated in the patent specification or file history. Vitronics, 90 F.3d at 1576. The established rules of claim construction include a prohibition against reading extraneous limitations into the claims which are not present. Renishaw, 158 F.3d at 1249. Limitations appearing in a claim cannot be ignored. Warner-Jenkinson Co., Inc. v. Hilton Davis Chemical Co., 520 U.S. 17, 29 (1997). Extrinsic evidence may only be considered if the terms cannot be construed from intrinsic evidence. An accused device has no place in the claim construction protocol. Scripps Clinic & Research Foundation v. Genentech, Inc., 927 F.2d 1565, 1580 (Fed. Cir. 1991). Courts do not redraft claims. Quantum Corp. v. Rodime, PLC, 65 F.3d 1577, 1584 (Fed. Cir. 1996).

Finally, under 35 U.S.C. § 112, ¶ 2, patent claims are invalid as indefinite if they are not amenable to construction and, as such, fail to notify the public of the scope of the patentee's exclusionary rights. See Honeywell Int'l v. Int'l Trade Comm'n, 341 F.3d 1332, 1338 (Fed. Cir. 2003). Terms that fail to set forth the bounds of the claims are indefinite as "insolubly ambiguous." Halliburton Energy Servs., Inc. v. M-I LLC, 514 F.3d 1244, 1249 (Fed. Cir. 2008).

## **B. Disputed Terms**

### **1. "relieved"/"unrelieved"**

NISTAC argues that no construction is necessary because the terms "relieved" and "unrelieved" are used in the '919 and the '955 patents in their ordinary and common manner. In the alternative, NISTAC proposes the term construction: "of reduced diameter." Conversely, defendants argue that the terms "relieved," "unrelieved," "reservoirs of oil," and "lands" are necessary to realize the alleged benefits set forth in the patents-in-

suit – all of these terms must be read together. These terms differentiate the piston disclosed in the '955 and '919 patents from the prior art. The specification teaches that the “relieved” portions of the piston skirt are formed by cutting away material from the surface of the piston skirt to define “lands” that surround “reservoirs” to retain oil during operation of the piston assembly. Thus, “relieved” must be construed to mean “cut away” (“unrelieved” as not cut away), “reservoirs of oil” means “relieved portions on the piston skirt that retain oil and are surrounded by lands” which are the “unrelieved portions of the piston skirt surrounding the relieved portions.”

NISTAC maintains that the specification consistently uses the terms “relieved” and “unrelieved” in a way that does not attribute any specialized, unique, or unexpected meaning. See '955 patent abstract at 2:49-50 (“the piston skirt relieved to define lands that are coated . . . .”); 3:62-63 (“the side walls being relieved on the exterior surface thereof . . . .”). NISTAC asserts that defendants are improperly attempting to add the requirement that the reduced diameter is a result of “cutting.” Relief can be accomplished by various fabrication methods, the patents make clear that these methods are merely illustrative. See '919 patent, 4:14-19 (“FIG. 4 illustrates how the skirt wall is relieved at areas 30, 31, 32, 33 one side of the piston. The relief may be carried out by mechanical machining.”); Id., 5:47-48 (“The undercutting may be carried out by machining . . . .”) It is improper to read method limitations from the patent specification into the claim. Phillips, 415 F. 3d at 1323; Baldwin Graphic Sys., 512 F.3d 1338, 1344-45 (Fed. Cir. 2008). NISTAC maintains that the claim term “relieved” should be defined in terms of what a relieved area of the piston is, and not by how it is fabricated. “Cutting” is not necessary to facilitate transfer of the SFL from the piston to the bore wall, rather it is that the piston has relieved/unrelieved

areas in the skirt that facilitates transfer of the SFL and the method of fabrication to create “relieved/unrelieved” areas is irrelevant to the transfer of SFL coating.

Contrary to NISTAC’s assertion, defendants are not improperly importing limitations into the claim terms “relieved” and “unrelieved.” The concept of “undercutting” or cutting material is used consistently throughout the specification to describe how the “relieved” areas of the skirt are formed. See ‘919 patent, 1:63-64 (“by selectively undercutting the piston skirt broad surface to define oil supply reservoirs”); 2:28-30 (“undercutting the exterior surface of said side walls to define radially exposed lands for sliding along said bore wall.”); 5:32-33 (“the exterior of the skirt wall is undercut at 34 to define radially exposed lands”). The only methods disclosed for forming the relieved portions are mechanical or electrical discharge machining, both of which cut away portions of the skirt wall to form the reservoirs for oil replenishment. The patents identify various processes for creating the relieved areas, which require removal or cutting away of material from the skirt wall. See ‘955 patent at 1:62, 2:26-28, 4:13-17, 5:30-33, 5:46-48, claim 10). This removal of material from the skirt wall creates the “relieved” areas that define, and are surrounded by, the unrelieved areas (i.e., the lands).

NISTAC’s proposed alternative construction “of reduced diameter” derives no support from the intrinsic evidence. There is no passage from the specification discussing areas “of reduced diameter.” A review of the claims and the specification make it clear that the patentees intended the claim term “relieved” to mean cut away and “unrelieved” to mean “not cut away.” There is no hint in the claims or the specification that the patentees had something else in mind; the term “relief” is consistently used as a verb akin to creation through some action. The court is persuaded that the terms “relieved”/“unrelieved” require

construction, and concludes that NISTAC's alternate construction of the term "relieved" to mean "of reduced diameter" is not supported by the intrinsic evidence.

Therefore, the court interprets "relieved"/"unrelieved" to mean "cut away"/"not cut away."

## **2. "reservoirs of oil"**

NISTAC argues that no construction is necessary because "reservoirs of oil" is used in its ordinary and common manner. Alternatively, NISTAC asserts that "reservoirs of oil" should be construed to mean "oil that is retained in the relieved portions of the piston." Defendants counter that "reservoirs of oil" means "relieved portions on the piston skirt that retain oil and are surrounded by lands."

NISTAC maintains that the patentees did not act as their own lexicographers by attributing a special or unique meaning to this term. See '955 Patent, 2:68-3:1 ("providing reservoirs of oil adjacent said retained oil films for replenishing oil . . ."); 5:15-18 ("the size and location of oil reservoirs during transient mode operation of the engine, such reservoirs being critical to the retention of oil film. . ."). Defendants improperly import their "surrounding" geometry limitation into this claim phrase by defining reservoirs of oil as being surrounded by lands. The '955 patent does not impose this restrictive limitation, according to NISTAC.

Defendants maintain that the specification teaches that the "relieved" portions of the piston skirt are formed by cutting away material from the surface of the piston skirt to define "lands" that surround "reservoirs" to retain oil during the operation of piston assembly. Cutting away material from the piston skirt surface is the only way described in the specification to create these oil retaining reservoirs. See '919 patent at 8:8-9 ("The object

of the undercut portion is to retain oil, particularly during the downstroke of the piston . . . .”); 5:14-19 (“Alternative arrangements of the lands can be shown in FIGS. 5 and 6. The benefit of these alternative embodiments is to enhance the size and location of oil reservoirs . . . such reservoirs being critical to the retention of the oil film to promote mixed and hydrodynamic lubrication.”).

Here, NISTAC’s proposal ignores the intrinsic evidence for the terms “reservoirs of oil” by disregarding the specific arrangement and purpose of the reservoirs set forth in the patents. The patents describe reservoirs of oil as the relieved areas of the piston skirt that retain oil and are surrounded by lands. Further, NISTAC’s alternative construction that the “reservoirs of oil” do not have to be surrounded by lands is nonsensical because if the “lands” do not surround the “reservoirs of oil” the claimed invention would be no different than the prior art described in Figure 1. See ‘955 patent, Fig. 1. Every embodiment shows the “lands” surrounding the “reservoirs of oil.” See ‘955 patent, Figs. 4-6. Thus, the court construes the term “reservoirs of oil” as “relieved portions on the piston skirt that retain oil and are surrounded by lands.”

### **3. “lands”**

Originally NISTAC argued that the term “lands” did not require construction because it is used in its ordinary and common manner. Alternatively, NISTAC asserted that “lands” should be construed to mean “the parts of the piston that are above and below the ring groove.”<sup>1</sup> NISTAC has since modified its proposed alternate construction and now asserts

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<sup>1</sup> In arguing that the term “lands” should be construed to mean “the parts of the piston that are above and below the ring groove,” NISTAC relies exclusively upon a technical reference manual published sixteen years after the issuance of the patents-in-suit. This manual is not contemporaneous with the patents-in-suit, thus it cannot reflect



that “lands” should be construed as “the unrelieved portions of the piston skirt wall.” NISTAC argues that this construction is fully supported by the ‘919 and ‘955 patents. See ‘919 patent, 4:18-19; ‘955 patent, 4:17-18; FIGS. 4-6 of both patents (“The unrelieved portions of the skirt wall becomes a land or lands for sliding engagement along the cylinder bore wall.”). Therefore, the term “lands” refers to those parts of the piston skirt wall that are not fabricated or removed by, for example, mechanical machining or electrical discharge machining. NISTAC argues defendants improperly require the lands to be surrounded by the relieved portions. Defendants counter that the “unrelieved” portions of the piston skirt constitute “lands” because “the piston skirt is modified to provide relief areas around lands supporting the solid film lubricant to reduce the interfacing area of the piston with the bore wall.” See ‘955 patent, 4:10-12; ‘919 patent, 4:19-21.

Here, the court finds that defendants’ proposed construction is consistent with the embodiments described in the patents-in-suit. The patentees ascribed a specific meaning to “lands” in the specification that is instrumental to achieving the reduced friction objections of the invention. NISTAC’s proposed construction of “lands” as “the unrelieved portions of the piston skirt wall” ignores the embodiments in the specification that the “lands” must surround the relieved portions of the piston skirt wall in order to achieve the friction reduction benefits of the invention. The claims of both the ‘955 and ‘919 patents require

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the meaning of the claim term as understood by persons of ordinary skill in the art “at the time of the invention . . . .” Phillips, 415 F.3d at 1323; see also Brookhill-Wilk 1, LLC v. Intuitive Surgical, Inc., 334 F.3d 1294, 1299 (Fed. Cir. 2003) (declining to consider extrinsic evidence dated 5 and 8 years subsequent to the issuance of the patent-in-suit for purposes of claim construction). In any event, by abandoning this proposed alternate construction for yet another construction, NISTAC concedes the error in its first argument, specifically, that “lands” requires no construction because it is used in its ordinary and common manner.

“undercutting the exterior of said side walls to define radially exposed lands for sliding along said bore wall . . . .” ‘955 patent, 9:37-39; ‘919 patent, 9:3-5. The inventors described how lands were not part of the prior art pistons as evidenced by Figures 1 and 2 of the specification. The patent specification distinguishes the patents-in-suit from the prior art pistons based on the presence of “reservoirs of oil” surrounded by “lands” on the piston skirt. Compare ‘955 patent, Fig. 2 (prior art) and Fig. 4 (piston disclosed in the ‘955 and ‘919 patent). Further, the specification indicates that “the piston skirt is modified to provide relief areas around lands supporting the solid film lubricant to reduce the interfacing area of the piston with the bore wall.” ‘955 patent, 4:9-12. Without “lands” surrounding the “reservoirs of oil” the claimed invention would be no different than the prior art piston shown in these figures. Every embodiment disclosed in the patents-in-suit has relieved portions surrounded by lands. Thus, NISTAC’s proposed construction is inconsistent with the embodiments described in the patents-in-suit because it ignores the intrinsic evidence requiring the lands to surround the reservoirs of oil. Therefore, the court interprets “lands” to mean “unrelieved portions of the piston skirt surrounding the relieved portions.”

#### **4. “solid film lubricant coating”**

Every independent claim of the ‘955 and the ‘919 patents require a “solid film lubricant coating.” NISTAC argues that “solid film lubricant coating” should be construed as “a coating that has lubricating properties and in solid film form with at least two crystals chosen from the group of graphite, boron nitride (BN), and molybdenum disulfide (MoS<sub>2</sub>), regardless of the existence of other crystals with lubricating properties.” Defendants argue that no construction is necessary because the claim phrase carries its plain and ordinary meaning.

The defendants argue a “solid film lubricant coating” is a film coating comprised of solid lubricants. NISTAC attempts to supplant this phrase -consisting of four words- with a convoluted construction that is substantially longer than the claim language itself. The court agrees with defendants that NISTAC improperly imports the limitation that the phrase “solid film lubricant coating” involves “crystals.” Every independent claim of the ‘955 and ‘919 patents require a “solid film lubricant coating,” however only independent claim 10 of the ‘955 patent and independent claims 2 and 9 of the ‘919 patent refer to any type of “crystals.” The doctrine of claim differentiation precludes NISTAC from using different terms to mean the same thing. See Comark Int’l Trade Comm’n v. Harris Corp., 156 F.3d 1182, 1187 (Fed. Cir. 1998). Further, in each of the independent claims of the ‘955 and ‘919 patents, the term “solid film lubricant” is followed by the words “consisting of.” Thus, the language that follows defines the composition of the “coating” and the phrase itself. Therefore, the court concludes that “solid film lubricant coating” does not require construction because it is used in its ordinary and common manner.

#### **5. “solid lubricants”**

The ‘955 patent states in relevant part that: “In a first aspect of this invention, a new piston construction is provided with a coating of solid film lubricant (SFL) comprising graphite and molybdenum disulfide in a resin . . . .” ‘955 Patent, 1:56-58. The specification adds that the invention may also have “one or more” of three specific features, which include: “(iii) increasing the operating temperature of the solid film lubricant by combining boron nitride and molybdenum disulfide in selected proportions.” Id. at 1:58-68.

NISTAC asserts that no claim construction is necessary for the phrase “solid lubricants” because it is used in its ordinary and common manner as understood by a

person of ordinary skill in the art in the context of the patents. Alternatively, NISTAC proposes that “solid lubricants” should be defined as “lubricants in solid form with at least two crystals chosen from the group of graphite, boron nitride (BN), and molybdenum disulfide (MoS<sub>2</sub>), regardless of the existence of other crystals with lubricating properties.” Defendants (except for defendant Honda) argue that “solid lubricants” is plural, indicating “two or more solid lubricants.” Defendant Honda maintains that “solid lubricants” should be construed as “graphite, molybdenum disulfide, and optionally boron nitride.”

NISTAC maintains that the defendants’ proposed definition of “two or more solid lubricants” impermissibly expands the meaning of the phrase to include any two or more solid lubricants, even though the patents-in-suit consistently refer to “solid lubricants” as having graphite, molybdenum disulfide or boron nitride only. NISTAC also asserts that defendant Honda’s definition is too restrictive because it requires the “solid lubricants” to consist of graphite and molybdenum in all instances, which excludes the possibility that the “solid lubricants” can consist of other combinations of the three, such as a combination consisting of graphite and boron nitride or a molybdenum disulfide and boron nitride combination.

Here, the claim language and the specification of the patents-in-suit describes the invention as a new piston assembly with a solid film lubricant coating consisting of graphite and molybdenum disulfide only. See ‘955 patent, 1:56-58; 8:54-56. Further, the specification adds that the invention may also have “one or more” of three specific features, including “increasing the operating temperature of the solid film lubricant by combining boron nitride and molybdenum disulfide in selected proportions.” Id. at 1:66-68. The patents-in-suit state that “this invention” includes the “novel solid film lubricant 44” shown

in Figure 8, and then with reference to the same Figure, the specification defines the “solid lubricants” of the “invention” to be graphite, molybdenum disulfide, and boron nitride:

The coating consists of solid lubricants 45 (graphite, MoS<sub>2</sub>, BN) and a support resin 46. The solid lubricant ingredients are operably present as a percentage of the total lubricant in the amount of about 25-58% for each of graphite and molybdenum disulfide, and about 7-16% for boron nitride.

‘955 patent, 4:36-41. Thus, the patents-in-suit describe the invention as having only three specific “solid lubricants”—graphite, molybdenum disulfide, and boron nitride. The “claims must be read in view of the specification [, which] is always highly relevant to the claim construction analysis.” Phillips, 415 F.3d at 1315. Therefore, the court construes “solid lubricants” as “graphite, molybdenum disulfide, and optionally boron nitride.”

#### **6. “solid film lubricant crystals”**

The claims of the ‘955 and ‘919 patents use the term “solid film lubricant crystals.” See ‘919 patent, 10:22-25 (“uniformly spraying a solid film lubricant coating onto said lands, said coating consisting of solid film lubricant crystals and a supporting resin . . .”). NISTAC contends that the proper construction for “solid film lubricant crystals” is “crystals with lubricating properties and in solid form with at least two crystals chosen from the group of graphite, boron nitride (BN), and molybdenum disulfide (MoS<sub>2</sub>), regardless of the existence of other crystals with lubricating properties.” Defendants, except for the Honda defendants, argue that the phrase should be construed as “crystals of two or more solid lubricants.” The Honda defendants maintain that the phrase must be construed as “crystals of graphite, molybdenum disulfide, and optionally boron nitride.”

Defendants maintain that the term “solid film lubricant crystals” modifies the phrase “solid film lubricant coating.” For instance, claim 10 of the ‘955 patent states: “[u]niformly

spraying a solid film lubricant coating onto said lands, said coating consisting of solid film lubricant crystals and a supporting resin . . . .” ‘955 patent, 9:32-34. Therefore, the two phrases must be construed to mean different things, and because “solid film lubricant crystals” is plural, it must mean “crystals of two or more solid lubricants.” Honda proposes that “solid film lubricant crystals” be construed to mean “crystals of graphite, molybdenum disulfide, and optionally boron nitride.”

The court rejects NISTAC’s argument that defendant Honda’s proposed construction is “too restrictive” because it excludes combinations “such as a graphite + boron nitride combination or a molybdenum disulfide + boron nitride combination.” There is no intrinsic evidence which supports NISTAC’s hypothetical combinations. As discussed above, the patents-in-suit limit the “solid lubricants” in the SFL coating to graphite, molybdenum disulfide, and boron nitride. Thus, the available “solid lubricants” and “solid film lubricant crystals” are coincident for practicing the invention and are limited to graphite, molybdenum disulfide, and boron nitride alone. The court construes the “solid film lubricant crystals” as “crystals of graphite, molybdenum disulfide, and optionally boron nitride.”

## **7. “asperities”**

Independent claims 10 and 18 of the ‘955 patent and independent claims 2 and 9 of the ‘919 patent require the presence of “asperities” into the “lands.” NISTAC maintains that asperities are well understood in the art rendering construction of the term unnecessary. Alternatively, NISTAC argues that “asperities” should be defined as “small irregularities, imperfections or roughness.” NISTAC asserts that this construction is commensurate with the extrinsic evidence and avoids the addition of unnecessary limitations of “formed by surface roughening” as defendants have proposed. See 18 ASM

Handbook 3 (Peter J. Blau, et al. Eds. 1992). As defined in the ASM Handbook, asperities are “small scale irregularities on a surface” or “minute imperfections on a seal face or surface of a mating ring that are the result of normal surface finishing processes.” An “asperity” is defined by the same source as “a protuberance in the small-scale topographical irregularities of a solid surface.” Id.; see also V. Durga N. Rao et al, Influence of Surface Characteristics and Oil Viscosity on Friction Behavior of Rubbing Surfaces in Reciprocating Engines, Paper No. 98-ICE-131, ICE-Vol. 31-2, 1998 Fall Technical Conference, ASME (1998).

Defendants maintain that “asperities” should be construed as “cavities formed by surface roughening.” NISTAC argues that defendants construction unnecessarily adds the limitation of “formed by surface roughening” which focuses on how asperities are formed rather than what they are. How asperities are created is irrelevant to the claim term. For example, in claim 10 of the ‘919 patent, “asperities are produced by use of acid etching” and in claim 12 of the ‘919 patent, asperities are mentioned without reference to how they are produced which demonstrates that the singular term “asperities” does not incorporate any limitations regarding how they are created.

The court rejects NISTAC’s contention that the term “asperities” does not require construction, as well as NISTAC’s argument that defendants are improperly adding limitations to their construction of the term. NISTAC’s construction fails to recognize that the patents-in-suit consistently treat “asperities” as cavities formed by a surface roughening process—and not the regular imperfections found on any surface. Figures 10-11 of the ‘955 patent depict the asperities as cavities. Also, the patents describe the asperities as “having a depth of 50” and as having “mouths.” Also, that the SFL is “sprayed onto the lands and

into the asperities” or “entrap[ped] in the asperities.” See ‘955 patent, 5:33-68; 6:33-38, 7:22-25; 7:58-62. Therefore, asperities are cavities with a mouth and a depth, capable of containing SFL. NISTAC’s construction as portraying asperities as inherent irregularities or imperfections is incompatible with the meaning ascribed to that term by the specification.

Further, the patents consistently explain that the asperities are “introduced.” For instance, the ‘955 patent at 5:33-35, states: “Next, a predetermined pattern of asperities (having a depth of 50) is introduced into said lands.” Therefore, NISTAC is incorrect that asperities can refer to inherent surface features. The patents describe that “the asperities are preferably introduced by acid etching . . . [a]lternatively, the asperities may be incorporated by mechanical means such as by low pressure grit blasting . . . or use of a hard stainless steel wire wheel, each followed by etching as before.” See ‘955 Patent, 5:49-64. In addition to relying solely on extrinsic evidence for its proposed alternate construction, NISTAC’s construction of “asperities” encompassing roughness as an inherent or natural part of any surface impermissibly removes the asperities limitation from the asserted claim which is contrary to the canons of claim construction. See Warner-Jenkinson Co., 520 U.S. at 29 (limitations appearing in a claim cannot be ignored); Pause Tech., LLC v. TiVo, Inc., 419 F.3d 1326, 1334 (Fed. Cir. 2005) (“In construing claims, however, we must give each claim term the respect that is due.”)

Thus, the court interprets “asperities” as “cavities formed by surface roughening.”



#### **8. “at least at regions of piston slap”**

Independent claim 18 of the ‘955 patent requires the SFL to be transferred “to the cylinder bore wall at least at regions of piston slap . . . .” ‘955 patent, 10:34-36. NISTAC contends that no construction is necessary because this claim phrase is used throughout the patents in its ordinary and common manner. The term is well understood by one of ordinary skill in the art. The Society of Automotive Engineers describes slap noise as “[n]oise caused by impact of the skirt with the cylinder bore due to secondary motion.” In the alternative, the claim term should be construed as “the regions where the piston skirt contacts the cylinder bore wall.” NISTAC argues that defendants improperly include the limitation that includes “each area” of piston slap. There is no basis for this as the patents do not require the coating to be transferred from the lands to the cylinder bore wall at each and every area of piston slap. NISTAC asserts that defendants do not point to any language suggesting that the patents require this limitation.

The court concludes that “at least at regions of piston slap” must be construed as “at each area where the piston skirt contacts the cylinder bore wall.” ‘955 patent, 10:36-37. The ‘955 patent requires that the transferred coating be present “at least at regions of piston slap.” Additionally, the specification indicates that piston slap causes undesirable frictional interactions and that the invention corrects this problem by transferring the SFL from the “lands” on the piston skirt to the cylinder bore wall resulting in operation in “substantially the hydrodynamic lubrication regime. . . .” ‘955 patent, 7:7-8. Thus, in order for the piston to operate in the desired hydrodynamic lubrication regime, the lubricant coating must transfer from the piston skirt to the cylinder bore wall wherever there is piston slap. Otherwise, the claimed invention would produce the undesirable frictional interactions

during reciprocating movement. Therefore, the court construes “at least at regions of piston slap” to mean “at each area where the piston skirt contacts the cylinder bore wall.”

#### **9. “depth of asperities”**

NISTAC argues that no construction is necessary for the term “depth of asperities” because this term is used in its ordinary and common manner. Defendants counter that this term should be construed as “average of the distances from the surface of the lands to the bottom of each asperity.”

The defendants contend that the patents are silent as to how to calculate the “depth of asperities.” The patents recite a single depth for the entire set of asperities. The singular nature of this depth is confirmed by the value of “lambda” which is defined in part by the “depth of the asperities.” However, a review of Figures 10 and 12 shows that each asperity has a unique depth. The only reasonable interpretation is to determine the average value of the depths of the asperities. The depth of a given asperity is the distance between the top of the asperity, which is the surface of the “land” and the bottom of the asperity. The specification describes the asperities as having a depth of 50-shown in Figures 10 and 11- as the distance between the surface of the land and the bottom of the asperity.

The court rejects defendants’ argument that they cannot ascertain a single or specific depth of the asperities. A person of ordinary skill in the art, after studying Figures 10 and 11 and their related description in the ‘919 and ‘955 patents would understand the claim term “depth of asperities” refers to the depth of the cavities formed by surface roughening. It is unnecessary to import additional limitations such as “measuring from the surface of the lands” to this term as it is used in its ordinary and common manner.

Therefore, the court concludes that no construction is necessary.

#### **10. “microasperities”**

The term “microasperities” appears twice in the patents-in-suit, one of which is in claim 18 of the ‘955 patent which requires that the transferred SFL coating possess “microasperities.” ‘955 patent, 10:37-38. The specification states that the transferred coating on the cylinder bore wall has “microasperities for trapping oil.” See ‘955 patent, 2:65-66. NISTAC argues that the term “microasperities” does not require construction because it is used in its common and ordinary meaning. A person of ordinary skill in the art would understand that the microasperities must be smaller compared to the dimensions of the asperities.

In the alternative, NISTAC asserts that this term should be construed as “microscopic irregularities, imperfections or roughness.” NISTAC relies on claim 18 in the ‘955 patent which requires the lambda (“the ratio of the height of the oil film thickness to the depth of the asperities”) is 6 or greater. ‘955 patent, 10:40-44. Therefore, NISTAC maintains that this means the depth of the asperities is around 5 microns or smaller, and microasperities necessarily must be smaller than the dimensions of the asperities. As such, NISTAC maintains that a person of ordinary skill in the art would understand the term “microasperities” in light of how “asperities” are discussed in the patents-in-suit.

Conversely, defendants argue that the term “microasperities” has no common understanding and is not defined in the patents-in-suit, therefore construction of this term is required. Defendants propose that “microasperities” be construed to mean “cavities significantly smaller than the asperities in the lands.” The “micro” modifier denotes something significantly smaller than its average size counterpart. The scientific usage of

“micro” refers to something that is six orders of magnitude smaller than a standard measure, a micrometer is 1/1,000,000 of a meter. The patents do not express a different meaning of the prefix “micro”- therefore the common usage of significantly smaller applies here. See Oxford American Dictionary 133 (Oxford Univ. Press, Inc. 1980); Webster’s Ninth New Collegiate Dictionary 218 (Merriam-Webster Inc. 1985). NISTAC’s alternative construction does not attribute a cavity structure to the asperities, which, as explained above, is required by the patents. Therefore, the court construes “microasperities” as cavities significantly smaller than the asperities in the lands.”

#### **11. “predetermined pattern”**

Independent claims 10 and 18 of the ‘955 patent and independent claims 2 and 9 of the ‘919 patent require the introduction of a “predetermined pattern” of “asperities” into the “lands.” Additionally, dependent claims 9 and 22 of the ‘955 patent require the “solid film lubricant coating” on the “lands” to have a “predetermined pattern” of grooves. NISTAC argues that no construction is necessary because this term is used in its ordinary and common manner. The inventors did not express any specialized, unique, or unexpected meaning to this term. Defendants counter that “predetermined pattern” must be construed to mean “an arrangement formed by a process and determined in advance.”

The patents do not define the phrase “predetermined pattern.” Because the patents-in-suit do not define “predetermined pattern” resort to extrinsic evidence is appropriate. See Phillips, 415 F. 3d at 1314 (“In some cases, the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words. In such circumstances,

general purpose dictionaries may be helpful.” (internal citation omitted). “Predetermined” denotes a decision made in advance. See FieldTurf USA, Inc. v. Sports Constr. Group LLC, 449 F. Supp. 2d 907, 923 (N.D. Ohio 2007) (construing “predetermined as “according to a prior plan.”) Dictionaries have a similar definition. See Oxford American Dictionary 702 (Oxford Univ. Press, Inc. 1980) (defining “predetermined” as “to decide in advance, to predestine.”)

Therefore, a predetermined pattern must be an arrangement that is determined in advance. Additionally, this arrangement must be “introduced into said lands” by the process of acid etching, low pressure grit blasting, or the use of a hard, stainless steel brush.” ‘955 patent, 5:33-34, 49-56. Thus, the court construes “predetermined pattern” to mean “an arrangement formed by a process and determined in advance.”

## **12. “shallow pockets”**

The term “shallow pockets” appears only in claim 10 of the ‘955 patent and claims 2 and 9 of the ‘919 patent. Each claim requires the step of “forming shallow pockets at the mouth of said asperities.” Additionally, dependent claim 15 of the ‘955 patent and dependent claim 12 of the ‘919 patent require that “said pockets in said film lubricant at the mouth of said asperities are created by brushing to remove and dimple the solid film lubricant at such mouths.” NISTAC contends that no construction is necessary because this term is used in its ordinary and common manner. The patent states in regard to figure 12 that “[f]inally, shallow pockets 55 are formed at the asperity mouths 56 such as by brushing or other equivalent means.” ‘955 patent, 5:43-44.

Conversely, defendants argue that “shallow pockets” should be construed as “dimples in the coating.” NISTAC maintains that the defendants are improperly importing

limitations because shallow pockets do not always consist of dimpling. For instance, compare independent claim 10 in '955 "forming shallow pockets at the mouth of said asperities" with dependent claim 15 "pockets in said film lubricant at the mouth of said asperities are created by brushing to remove and dimple the solid film lubricant at such mouths." NISTAC, relying on the declaration of Dr. Baron,<sup>2</sup> claims that a person of ordinary skill in the art would know that "shallow pockets" do not always mean dimples in the SFL coating, and instead can mean dimples or other forms of shallow depressions besides dimples.

Defendants counter that each claim that refers to shallow pockets requires the step of "forming shallow pockets at the mouth of said asperities." The specification indicates that "shallow pockets . . . are formed at the asperity mouths . . . such as by brushing or other equivalent means." Further, "[t]he pockets are formed in the mouth areas of the coating asperities by steel wire brushing or equivalent to achieve the dimpling effect and thus create oil pockets, comparable to having separate grooving . . . ." '955 patent, 6:33-36. Additionally, once the SFL coating is applied to the piston skirt, the coating is then "dimpled to create pockets for oil film replenishment." '955 patent, 4:6-9. Further, "Piston making herein is enhanced in novelty by asperity definition containing SFL, which SFL is

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<sup>2</sup> NISTAC submitted the declaration of Richard P. Baron in support of its response brief on claim construction. Defendants filed a motion to strike the Baron declaration. See Dkt. No. 81. Thereafter, the parties entered a stipulated order that the Baron declaration would be included as part of the record on claim construction, however the court would not rely on this evidence unless necessary for claim construction. See Dkt. No. 84. If the court determined that reliance on expert extrinsic evidence was necessary, it was to request the parties meet and confer and propose a procedure for addressing this evidence. Id. at 2. The court declines to rely on the expert extrinsic evidence contained in the Baron declaration, therefore a meeting between the parties to address this evidence is unnecessary.

dimpled, such as by brushing, to provide oil pockets to replenish the attracted oil film.” *Id.*, 7:22-25.

Here, NISTAC’s reliance on figure 12 only ignores the other intrinsic evidence regarding the meaning of “shallow pockets.” Further, Nistac’s reliance on SAE International Surface Vehicle Standard J2612, is improper because it is dated more than 17 years after the issuance of the patents in suit and further shows that “shallow pockets” must be construed because it is not understood by its ordinary and common manner. NISTAC overlooks the fact that dimpled coating is a key aspect of the invention. *See* ‘955 patent, 4:3-9 (“This invention coats the piston skirt with a novel solid film lubricant. . . The solid film lubricant is locked in place on such surface, polished, and dimpled to create pockets for oil film replenishment.” Therefore, the court construes “shallow pockets” as “dimples in the coating at the mouth of the asperities.”

### **13. “low friction”/“providing a low friction piston”**

Defendants argue that the terms “low-friction” and “providing a low friction piston” are indefinite because the patents do not provide a baseline level of friction to which a piston is compared to determine if it is low friction. Therefore, defendants argue that the patent claims are indefinite and invalid under 35 U.S.C. § 112, ¶ 2.

“The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.” 35 U.S.C. § 112, ¶ 2. “Claims need not be plain on their face in order to avoid condemnation for indefiniteness; rather, claims must only be amenable to construction.” *Wellman, Inc. v. Eastman Chemical Co.*, 642 F.3d 1355, 1366 (Fed. Cir. 2011). Thus, § 112, ¶ 2 “focuses on whether the claims, as interpreted in view of the written description, adequately perform

their function of notifying the public of the scope of the patentee's right to exclude.” Honeywell International, Inc. v. International Trade Comm., 341 F.3d 1332, 1338 (Fed. Cir. 2003). “Because a claim is presumed valid, a claim is indefinite only if the claim is insolubly ambiguous, and no narrowing construction can properly be adopted.” Id. at 1338-39 (internal quotations omitted). An accused infringer must demonstrate “by clear and convincing evidence that one of ordinary skill in the relevant art could not discern the boundaries of the claim based on the claim language, the specification, the prosecution history, and the knowledge in the relevant art.” Wellman, 642 F.3d at 1366. “Claim terms must provide a discernible boundary between what is claimed and what is not claimed . . . .” Id. at 1367.

The court concludes that the terms “low friction” and “providing a low friction piston” are definite; in several places the patents describe what a low friction piston is and how it can be constructed. See ‘955 patent, 2:1-3:2. The ‘955 patent states that “[w]hen using the above-identified solid film lubricant and resin, the total coefficient of friction in an oil-fed system has been measured to be 0.03-0.06 in the boundary/dry lubrication region.” ‘955 patent, 5:6-8. Additionally, the ‘955 patent discloses that:

Recent research shows that piston slap (an angled thrust of the piston skirt against the cylinder bore as a result of the articulated movement of the connecting rod) generates boundary-to-mixed lubrication mode during such movement of the piston (see FIG. 15). This is undesirable because the coefficient of friction is at its highest level (above 0.14) in the boundary lubrication regime and above 0.05 in the mixed lubrication regime, characteristic of prior art piston skirt assemblies. Even with a solid film lubricant coating on such prior art pistons, the lubrication regime is not shifted substantially to hydrodynamic. This invention achieves a coefficient of friction (between the piston and cylinder bore wall) that is at or below 0.04; this means the piston skirt, operating with an oil-fed system, is operative in substantially the hydrodynamic lubrication regime with possibly a minor amount in the mixed lubrication regime (see Stribeck diagram of FIG. 15°



plotting ZN/P as a function of friction.

Id., 6:61-7:12. Further, dependent claim 3 of the '955 patent states that the piston assembly for the low-friction piston "in which said coated piston has a coefficient of friction, in an oil-fed cylinder bore, in the range of 0.02-0.06 at temperatures up to 750° F." '955 patent, 8:65-68.

Contrary to defendants' argument, these claim terms are definite and the specification and claim language sufficiently disclose the coefficient of friction range for a low friction piston. Defendants' reliance on Honeywell International, supra, is misplaced. In Honeywell, the claimed invention required a person of skill in the art to choose among four different sample preparation methods, with each method affecting whether the accused products fell within the scope of the asserted claims. Honeywell, 341 F.3d at 1339. The court concluded that the claims were insolubly ambiguous because no intrinsic or extrinsic evidence indicated a single preferred method of sample preparation. Id. at 1340-41.

While the claims here do not recite how to measure friction, a person of ordinary skill in the art would be familiar with what friction is and how to measure the coefficient of friction based on industry standards and tests such as the 1988 American Society of Testing and Materials ("ASTM") standard measure for measuring friction. See ASTM D 2714-88 STANDARD TEST METHOD FOR CALIBRATION AND OPERATION OF THE FALEX BLOCK-ON RING FRICTION AND WEAR TESTING MACHINE (1988); see also ASM Handbook at 5. "[A] patent applicant need not include in the specification that which is already known to and available to a person of ordinary skill in the art." Wellman, 642 F.3d at 1368. Because a person of ordinary skill in the art would have followed published

industry standards, the asserted claims are not indefinite for failure to specify how to measure friction.

Defendants have failed to establish by clear and convincing evidence that one of ordinary skill in the art could not discern the meaning of the terms “low friction” and “providing a low friction piston” based upon the claim language, specification and industry standards in the art. These terms are not insolubly ambiguous under 35 U.S.C. § 112, ¶ 2.

### III. CONCLUSION

For the reasons set forth above, the court concludes,

With respect to the patents-in-suit:

The terms “relieved/unrelieved” mean “cut away”/“not cut away.”

The phrase “reservoirs of oil” means “relieved portions on the piston skirt that retain oil and are surrounded by lands.”

The term “lands” means “unrelieved portions of the piston skirt surrounding the relieved portions.”

The phrase “solid lubricants” means “graphite, molybdenum disulfide, and optionally boron nitride.”

The phrase “solid film lubricant crystals” means “crystals of graphite, molybdenum disulfide, and optionally boron nitride.”

The term “asperities” means “cavities formed by surface roughening.”

The phrase “at least at regions of piston slap” means “at each area where the piston skirt contacts the cylinder bore wall.”

The term “microasperities” means “cavities significantly smaller than the asperities

in the lands.”

The phrase “predetermined pattern” means “an arrangement formed by a process and determined in advance.”

The phrase “shallow pockets” means “dimples in the coating at the mouth of the asperities.”

Defendants’ motion to strike the Baron declaration [#81] is MOOT.

Defendants’ unopposed motion to expedite briefing schedule re: motion to strike [#82] is MOOT.

SO ORDERED.

Dated: September 27, 2012

s/George Caram Steeh  
GEORGE CARAM STEEH  
UNITED STATES DISTRICT JUDGE

CERTIFICATE OF SERVICE

Copies of this Order were served upon attorneys of record on  
September 27, 2012, by electronic and/or ordinary mail.

s/Marcia Beauchemin  
Deputy Clerk